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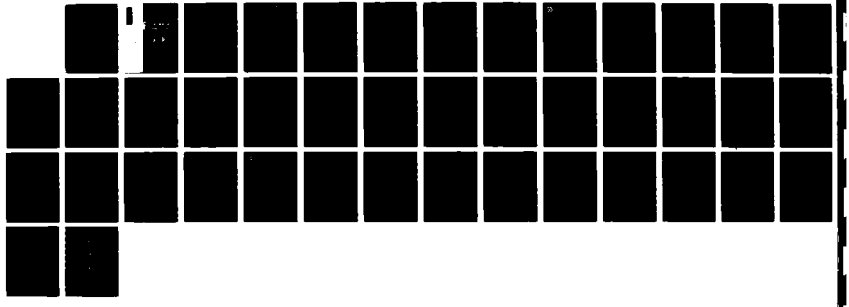

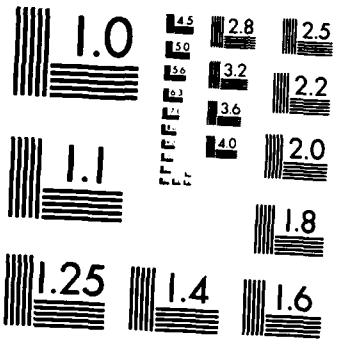

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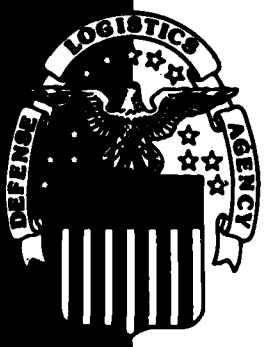

DISMS WORKLOAD CAPACITY STUDY

DEPARTMENT OF DEFENSE

DEFENSE LOGISTICS AGENCY

Cameron Station
Alexandria, Virginia 22304-6100

Operations Reseach and Economic Analysis Office

APRIL 1987

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)

The Defense Logistics Agency Integrated Subsistence Management System (DISMS) provides on-line computer support to Defense Personnel Support Center ~~(DPSC)~~ subsistence management activities. Phase IV, now in design, will provide on-line support to contractor bid evaluation. The purpose of this study was to assess the transaction workload associated with this increment in order to determine appropriate computer sizing. Specifically, the study identified the types and frequencies of online transactions expected with implementation of DISMS Increment IV. Transaction data developed during this study provide a reasonable estimate of the workload resulting from Increment IV. This data indicates that the workload may exceed that presently posed by Increments I-III, combined. The Defense Systems Automation Center ~~(DSAC)~~ will use this data to determine the appropriate computer size to address the workload.

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Capacity (Quantity).

DEFENSE LOGISTICS AGENCY

Inter-Office Memorandum

: 5 AUG 1987

IN REPLY REFER TO DLA-LO (Mr. Bryant/(AV)695-4046/1a)

SUBJECT: Revised Increment IV Transactions Volumes

TO: DLA-ZS

1. References:

   a. Final report, DISMS Workload Capacity Study, April 1987, Project 6039.

   b. DLA-ZS IOM, 10 Mar 87, subject: DISMS Follow-On Study.

   c. DLA-LO IOM, 6 Apr 87, subject: DISMS Follow-On Study.

2. This IOM and its enclosure are submitted as an addendum to the report referenced in 1 a above.

3. Our study of the DISMS Bid Response Process, referenced in 1 b and 1 c above, has revealed new information which directly affects our previous estimates of computer throughput demands resulting from DISMS Increment IV. Data obtained from a two week survey of perishable item buyer activity together with information gained from detailed interviews with other subsistence contracting personnel has led us to conclude that the volume of bid response transactions will be much lower than orginally estimated.

4. The key statistic in our previous Bid Response transaction estimates was the number of solicitation closings (or bid openings). Almost all bid response estimates were based on closings, offers per closing and lines offered. We now estimate that closings will average about 315 per month instead of the 980 per month previously projected. Additionally, offers per closing and lines offered will average 7 and 8 respectively, not the 10 and 10 previously estimated. Accordingly, total Bid Response transactions are now projected to be 29,410 per month instead of 148,540.

5. The revised Bid Response transaction estimates are enclosed. The enclosure also shows the enter-key depressions (EKDs) that will be generated by those transactions for both Bid Response alone and all of DISMS Increment IV.

6. Questions pertaining to these revised transaction estimates should be addressed to Mr. John Bryant, DORO, (AV) 695-4046.

1 Encl

JEFFREY GOLDSTEIN
Acting Chief
Operations Research and
Economic Analysis Office

cc:
DPSC-HP
DPSC-HJ
DSAC-VB
DSAC-VF
DSAC-T

DISMS BID RESPONSE PROCESS

Revised Transactions Volume Estimates

20 July 1987

Type of Transaction	Volume Per Month	Enter Key Depressions Per Transaction			Most Likely EKDs Per Month
		Min	Most Likely	Max	
VII. Bid Response					
A. Enter Vendor Responses	2205	2	2	2	4410
B. Enter Representations/ Certifications	2205	2	2	6	4410
C. Enter Under Offers					
1. Line	17,640	1	1	1	17,640
2. Stock Number	300	2	3	5	900
3. Plant Location/ Shipping Point	2205	2	3	5	6615
D. Enter Vendor Qualifications					
1. All/None	1100	2	2	2	2200
2. Minimum/Maximum	1100	2	2	2	2200
3. Tie-Ins	350	3	3	3	1050
4. Escalating/ De-escalating	120	2	2	2	240
E. Enter Vendor Options	300	2	3	5	900
F. Revise Vendor Responses	44	2	2	2	88
G. Revise Representations/ Certifications	22	2	2	6	44

Type of Transaction	Volume Per Month	Enter Key Depressions Per Transaction			Most Likely EKDs Per Month
		Min	Most Likely	Max	
H. Revise Under Offers	440	1	1	1	440
1. Line					
2. Stock Number	25	2	3	5	75
3. Plant Location/ Shipping Point	44	2	3	5	132
I. Revise Vendor Qualifications					
1. All/None	110	2	2	2	220
2. Minimum/Maximum	110	2	2	2	220
3. Tie-Ins	50	3	3	3	150
4. Escalating/ De-escalating	20	2	2	2	40
J. Revise Vendor Options	40	2	3	5	120
K. Request Abstract of Offers	350	2	2	2	700
L. Request Evaluation of Offers	315	2	2	2	630
M. Solicitation Response Inquiries	315	2	10	50	3150
TOTALS	29,410				46,574
TOTALS FOR ALL OF INCREMENT IV	77,310				328,333

DISMS WORKLOAD CAPACITY STUDY

APRIL 1987

Mr. John W. Bryant III
Operations Research and Economic Analysis Office
Headquarters, Defense Logistics Agency
Cameron Station, Alexandria, Virginia 22304-6100

DEFENSE LOGISTICS AGENCY
HEADQUARTERS
CAMERON STATION
ALEXANDRIA, VIRGINIA 22314

DLA-LO

FOREWORD

The Defense Personnel Support Center (DPSC) is in the process of implementing an automated data system which will consolidate five separate subsistence management systems and replace many current "batch" processes with online capability. This new system, the Defense Integrated Subsistence Management System (DISMS) is being implemented in nine increments. Increments I - III have been implemented and Increment IV is in the final design stage. As a result of the additional online workload expected, it became apparent that a larger computer would be needed to absorb the Increment IV workload and provide sufficient capacity for additional workload growth. The projected impact of Increment IV was the subject of this study, which was sponsored by the DLA Office of Telecommunications and Information Systems and performed by the DLA Operations Research and Economic Analysis Office.

The purpose of this study was to develop information on the magnitude of the Increment IV workload which could be utilized to determine the size of the computer to be purchased for DISMS. This required identification of the types and frequencies of Increment IV transactions and conversion of this data into a format which could be used by the DLA Systems Automation Center (DSAC) as input to their computer sizing models.

It is the conclusion of the study that the transaction data presented does provide a reasonable assessment of the impact of Increment IV. Accordingly, there is little doubt that Increment IV will exceed the combined workload of Increments I - III. The implications of this finding, as far as the proper size of a CPU for DISMS is concerned, will depend on the results of the DSAC computer sizing models.

ROGER C. ROY
Assistant Director
Policy and Plans

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LIST OF TABLES

I. INTRODUCTION

A. Background. The Defense Integrated Subsistence Management System (DISMS) is an automated data system designed to consolidate five separate subsistence management systems and replace many current "batch" processes with online capability. DISMS is being implemented at the Defense Personnel Support Center (DPSC) in nine increments. This incremental approach enables ongoing operation of the existing system while the new system is being designed and implemented. Increments I - III, which consisted of financial, cataloging, technical and some contracting processes have been implemented. Increment IV, composed primarily of the remaining contracting functions, is in the final design stage. Because of the additional online workload anticipated as a result of Increment IV, the Office of Telecommunications and Information Systems (DLA-Z) is currently in the process of purchasing a mainframe that will replace the existing CPU. In order to correctly determine the size of the CPU to be purchased for DISMS, DLA-Z requested that the DLA Operations Research and Economic Analysis Office (DLA-LO) perform a study of data inputs which will be associated with the implementation of Increment IV.

B. Computer Sizing Data Requirements. The decision regarding the appropriate production mainframe to be purchased for DISMS Increment IV will depend largely on the results of two simulation models currently maintained by DLA Systems Automation Center (DSAC) analysts. The CRYSTAL model simulates the performance of the DISMS data base management system (TIS). The CRYSTAL model produces system response time (screen-to-screen) estimates which are then used as input to the BEST/1 model which actually sizes the CPU. The BEST/1 model also uses historical performance data (enter-key depressions) from Increments I - III as part of its input. Increments I - III are currently consuming about sixty percent of the existing CPU and preliminary results from the computer sizing models indicate that the addition of Increment IV would completely saturate the existing production mainframe. To date, however, DLA-Z has been unable to determine the appropriate size of a new mainframe for DISMS because of concerns about the reliability of the DSAC simulation model results. The major area of concern relates to the accuracy of the Increment IV transaction volume estimates which have been developed for input to these models. Initial efforts to obtain the required information were complicated by the lack of a finalized Increment IV design. Although Increment IV is now in the final design stage, it is still difficult to develop transaction volume estimates because many of the transactions will involve new or modified procedures for which no historical data exists.

C. Study Objectives.

The major purpose of this study was to identify the types and frequencies of online transactions which would be associated with the implementation of DISMS Increment IV. Transactions performed in a "batch" mode are not considered in the computer sizing models since the peak hourly volume of online transactions is the most critical factor in properly sizing the CPU needed for DISMS.

The second study objective was to convert this transaction data into a format that could be utilized by the DSAC computer sizing models. This entailed the development of information pertaining to the actual steps required by the user in performing the various online transactions.

II. TECHNICAL APPROACH

A. General Methodology. The general approach in this study was to identify those individuals who had been involved in earlier efforts to develop Increment IV transaction data and to meet with those individuals to clarify the estimates and their related derivations and definitions. Development of the transaction list and associated monthly volume estimates involved several meetings and discussions with DISMS personnel which resulted in significant modifications to the existing transaction data base. Conversion of this transaction data into usable computer sizing model input required extensive interviews with DSAC functional analysts who were responsible for the design of the various Increment IV processes. Specifically, the DSAC analysts were asked to estimate the number of terminal display screens that an Increment IV user would need in order to perform each type of transaction.

B. Working Definitions. Early in the process of developing Increment IV transaction estimates, it became obvious that prior efforts to develop data of this type had been hampered by the lack of a consistent definition of a transaction. Consequently, previous transaction estimates consisted of a mixture of user-performed tasks and system-generated activities ranging from individual terminal displays to entire contracting processes. Therefore, it was essential to develop a working definition of a transaction. It also was decided that a transaction should be defined from a functional perspective rather than a system-perspective. This meant that, to the extent possible, transactions could be defined in terms of historical data (e.g. number of contracts, solicitations, etc.) therefore enabling some assessment to be made of the reasonableness of these estimates. Accordingly, the definitions of the major terms associated with this data collection effort are as follows:

1. Transactions are activities requiring online user intervention in order to establish, modify, review, release, print or delete records or files. As such, transactions do not include system-generated activities which occur automatically and require no user intervention other than a single depression of the enter-key or a function key. Accordingly, transactions include such activities as establishing Blanket Purchase Agreements, releasing pending contracts and performing a solicitation response inquiry. Transactions would not include, however, the system-generated updates of contract files, vendor history files, or item history files that occur automatically when a pending contract is released.

2. Enter Key Depressions (EKDs) are calculated (for computer sizing purposes) by multiplying the transaction volume by the number of terminal display screens required to perform the transaction.

Obviously, those transactions which cause other system-generated activities, such as file updates, to occur are more complex and require more computer time to perform than would a simple inquiry or display of data. Accordingly, the difference in complexity of the various Increment IV transactions is programmed into the logic of the computer sizing models and need not be duplicated in the count of Increment IV transactions.

III. FINDINGS

A. Transaction Volumes

Table 1 provides a listing of Increment IV transactions and corresponding monthly volume estimates developed as a result of this study. Also included in Table 1 are the minimum, maximum and most likely enter-key depressions (EKDs) required per transaction and the most likely EKDs per month. The most likely EKDs per month were developed for use by DSAC in their computer sizing models. The information on minimum and maximum EKDs per transaction was obtained in anticipation of future data needs which may be associated with an evaluation of DISMS work flow.

Twelve contracting processes are represented in Table 1 as well as a transportation rate retrieval process (RACER) and Realtime Recommended Buys. Based on these fourteen processes, there will be a total of 196,440 online Increment IV transactions per month which equate to 501,015 EKDs per month. On the average, therefore, an Increment IV transaction will require about three terminal display screens.

The two processes requiring the largest volume of monthly transactions are Bid Response (148,540) and Inquiries (28,348) accounting for 90 percent of all transactions. These two processes also account for 86 percent of all EKDs. However, the Inquiry process accounts for almost as many EKDs as does Bid Response because an average of seven screens will be required per inquiry compared to about two screens for each Bid Response transaction.

B. Derivation of Estimates. As noted previously, Increment IV transactions were defined from a functional perspective to allow monthly volume estimates to be based, where feasible, on historical data. Therefore, it was possible, for example, to develop the majority of Bid Response transaction estimates using the following rationale:

> There are 500 online solicitations per month. Of these solicitations, 120 will generate 600 contract closings (or 5 each). The remaining 380 solicitations will each generate one closing. Total contract closings per month, therefore, equal 980. Each contract closing will generate ten vendor responses for a total of 9800 vendor responses per month. Each vendor response will average 10 lines for a total of 98,000 lines per month.

Table 1

TRANSACTION VOLUME ESTIMATES-DISMS INCREMENT IV

Real Time Transactions

Type of Transaction	Volume Per Month	Enter Key Depressions Per Transaction			Most Likely EKDs Per Month
		Min	Most Likely	Max	
I. Basic Agreements					
A. Blanket Purchase Agreements					
1. Establish BPAs	15	5	5	5	75
2. Change BPAs	1	5	5	5	5
3. Cancel Pending BPAs	1	3	3	3	3
4. Release BPAs	15	3	3	3	45
5. Reissue & Release BPAs (FF&V)	300 (Annually)	3	3	3	900*
6. Print New BPAs	15	2	2	2	30
7. Print Reissued BPAs	300 (Annually)	2	2	2	600*
B. Indefinite Delivery Type Contracts					
1. Establish Pending IDTC Header Data	11	6	6	6	66
2. Remit-to Data	25	1	1	1	25
3. Line Data	500	1	1	1	500
4. Plant Location Data	100	2	2	2	200
5. Shipping Pt Data	100	2	2	2	200

*These are peak month estimates since these transactions occur once per year.

Type of Transaction	Volume Per Month	Enter Key Depressions Per Transaction			Most Likely EKDs Per Month
		Min	Most Likely	Max	
6. Change IDTC	1	6	6	6	6
7. Cancel IDTC	1	3	3	3	3
8. Release IDTCs	10	3	3	3	30
TOTALS	1395				2688
II. Generate Awards (Process Updates)	These are system-generated transactions requiring no user intervention other than the release of a contract in the pre-post pending award process.				
A. Contract Record					
B. Vendor History					
C. DCAS/EDI Abstracts					
D. Item History					
E. Purchase Request					
F. Solicitation					
G. IDTC & BPA					
H. Procurement Options					
I. MIS Data					
III. Pre-Post Pending Awards					
A. Establish Pending Contract					
1. Build Administrative (Header) Data	1500	3	5	5	7500
2. Accept Sabers Evaluation	1350	2	2	2	2700
3. Complete Pending Contract Lines	1350	4	15	50	20,250
4. Add PR lines	2250	3	3	3	6750

Type of Transaction	Volume Per Month	Enter Key Depressions Per Transaction			Most Likely EKDs Per Month
		Min	Most Likely	Max	
5. Request Commitment Adjustment	300	2	2	2	600
6. Request Draft Print	1200	2	2	2	2400
7. Release/Print Contract	1500	2	2	2	3000
B. Change Pending Contracts	100	3	3	3	300
C. Cancel Pending Contracts	5	3	3	3	15
TOTALS	9555				43,515
IV. Post-Post Pending Award					
A. Post-Post DSR-E	25	2	2	2	50
B. Post-Post NSC	500	2	2	2	1000
C. Post-Post DSR-PAC	700	2	2	2	1400
D. Field Buy FF & V	1600	2	2	2	3200
TOTALS	2825				5650
V. Process Funds					
A. Commitments/Obligations					
1. Request Commit Incr	Part of Pre-Post Pending Awards Process (Item III Above)				
2. Commit Incr Details					
3. Commit Decr Details					
4. Request Obl	System Generated by Release of Contracts in Pre-Post Pending Award Process (Item III)				
5. Obl Details					

Type of Transaction	Volume Per Month	Enter Key Depressions Per Transaction			Most Likely EKDs Per Month
		Min	Most Likely	Max	
B. Establish Funding Reserves for Pending Awards	300	2	2	2	600
TOTALS	300				600
VI. Print Hard Copy	Part of Pre-Post Pending Award Process, Item III above				
VII. Bid Response					
A. Enter Vendor Responses	9800	2	2	2	19,600
B. Enter Representations/ Certifications	9800	2	2	6	19,600
C. Enter Under Offers					
1. Line	98,000	1	1	1	98,000
2. Stock Number	1250	2	3	5	3750
3. Plant Location/ Shipping Point	9800	2	3	5	29,400
D. Enter Vendor Qualifications					
1. All/None	4900	2	2	2	9800
2. Minimum/Maximum	4900	2	2	2	9800
3. Tie-Ins	1500	3	3	3	4500
4. Escalating/ De-escalating	500	2	2	2	1000
E. Enter Vendor Options	1250	2	3	5	3750
F. Revise Vendor Responses	196	2	2	2	392
G. Revise Representations/ Certifications	98	2	2	6	196

Type of Transaction	Volume Per Month	Enter Key Depressions Per Transaction			Most Likely EKDs Per Month
		Min	Most Likely	Max	
H. Revise Under Offers	1960	1	1	1	1960
1. Line					
2. Stock Number	25	2	3	5	75
3. Plant Location/ Shipping Point	196	2	3	5	588
I. Revise Vendor Qualifications					
1. All/None	490	2	2	2	980
2. Minimum/Maximum	490	2	2	2	980
3. Tie-Ins	150	3	3	3	450
4. Escalating/ De-escalating	50	2	2	2	100
J. Revise Vendor Options	125	2	3	5	375
K. Request Abstract of Offers	1100	2	2	2	2200
L. Request Evaluation of Offers	980	2	2	2	1960
M. Solicitation Response Inquiries	980	2	10	50	9800
TOTALS	148,540				219,256

Type of Transaction	Volume Per Month	Enter Key Depressions Per Transaction			Most Likely EKDs Per Month
		Min	Most Likely	Max	
VIII. Inquiries					
A. Solicitation	3000	2	15	50	45,000
B. Pending Contract	2000	3	9	30	18,000
C. Contract	18,000	2	7	19	126,000
D. Purchase Request	1500	3	7	20	10,500
E. Vendor	1000	2	2	3	2000
F. Supply Bulletin	1000	4	4	4	4000
G. CGC	50	3	3	3	150
H. Clause Data	25	3	7	7	175
I. Std MOD Stmt	50	2	2	2	100
J. IDTC	10	2	6	11	60
K. BPA	20	2	2	2	40
L. Vendor Perf	1500	3	3	5	4500
M. Item Proc Hist	50	2	3	3	150
N. Registers/Tables					
1. Contract	35	3	3	5	105
2. Solicitation	35	3	3	5	105
3. CGC Serial Number	10	3	3	5	30
4. PR Age Group	50	3	3	5	150
5. Variance Tables	10	3	3	5	30
6. Country Code Tables	1	3	3	5	3

Type of Transaction	Volume Per Month	Enter Key Depressions Per Transaction			Most Likely EKDs Per Month
		Min	Most Likely	Max	
7. Unit of Purchase Table	1	3	3	5	3
8. State Table	1	3	3	5	3
TOTALS	28,348				211,104
IX. Maintenance					
A. Registers/Tables	100	2	2	2	200
B. Vendor File	50	5	5	5	250
C. CGC File	10	1	1	1	10
D. Clause Data/Master Solicitations	10	8	8	8	80
E. Contract Prov Pkg	500	9	9	9	4500
F. Supply Bulletin File	30	2	3	3	90
TOTALS	700				5130
X. Pending Amendments					
A. Establish Admin Data	300	3	3	3	900
B. Clause Changes	20	1	1	1	20
C. Add PRs	10	3	3	3	30
D. Review Lines	5	3	3	3	15
E. Establish/Eliminate Supply Amendment Request	5	1	1	1	5
F. Establish/Revise Buyer Line Change	5	2	2	2	10
G. Cancel/Force Close Solicitation	25	1	1	1	25
TOTALS	370				1005

Type of Transaction	Volume Per Month	Enter Key Depressions Per Transaction			Most Likely EKDs Per Month
		Min	Most Likely	Max	
XI. Pre-Solicitation					
A. PR Number for Special Reserve Funding	10	1	1	1	10
B. Supply Changes to the PR	600	1	1	1	600
C. New PR Line	120	1	1	1	120
D. Buyer's Changes To the PR	600	1	1	1	600
E. Pre-Solicitation Report Request	240	2	2	2	480
F. Purchase Request Inquiry Keys	500	1	1	1	500
TOTALS	2070				2310
XII. Pending Solicitations					
A. Establish Admin Data	250	2	2	2	500
B. Review/Revise Pending Solicitation	250	3	15	50	3750
C. Cancel Pending Solicitation	2	1	1	1	2
TOTALS	502				4252
XIII. RACER					
A. Inquiries	70				
B. Maintenance	50				
TOTALS	120		3*		360

Type of Transaction	Per Month	Enter Key Depressions Per Transaction Min	Most Likely	Max	EKDs Per Month
XIV. Realtime Recommended Buys					
A. Establish Recommended Buys	350				
B. Change Recommended Buys	275				
C. Delete Recommended Buys	40				
D. Recommended Buy Inquiries	500				
E. Request Delivery Schedule	100				
F. Print Delivery Schedule	100				
G. Release Recommended Buys	350				
	1715		3*		5145
TOTALS(ALL TRANSACTIONS)	196,440				501,015

* Since EKDs per transaction were not readily available, the Increment IV average of 3 EKDs per transaction was utilized for RACER and Realtime Recommended Buys.

IV. ANALYSIS

A. Interpretation of Study Results. The transaction and EKD data presented in this report are intended for use as input to the CRYSTAL and BEST/1 computer sizing models. However, it is possible to make some observations about the raw data. For instance, the total of 501,015 Increment IV EKDs per month equates to an average of 2850 EKDs per hour based on 22 workdays per month and eight hours per day. However, the computer sizing models are concerned with a "peak" hourly workload. This peak workload is based on the assumption that 80 percent of the DISMS daily workload will occur during a four hour period (actually two periods of two hours each). Accordingly, the peak hourly workload for Increment IV would equal 4550 EKDs. As early as 3 June 1986, the computer sizing models predicted that an AMDAHL 5860 CPU would be required to handle Increments I through IV, including an estimated 3875 Increment IV EKDs per peak hour, and provide sufficient capacity for workload growth (see Appendix). The implications of this larger workload estimate, as far as the proper size of a CPU for DISMS is concerned, won't be known until the results of the DSAC computer sizing models are available.

B. Reasonableness of Transaction Estimates

It was not always possible to quantify the monthly transaction volumes for Increment IV on the basis of something tangible like the number of contracts or solicitations per month. Consequently, certain estimates, especially those for the various Inquiry transactions, were developed by gauging the number of users as well as the number of times per month each user might perform these transactions. Because of this subjective approach, a method was needed to assess the reasonableness of these estimates. The method chosen was to compute the manhours that might be required to perform these transactions. Since no manhour standards have been established, as yet, for Increment IV processes, the project analysts used standards which were developed by the DLA Performance Standards Support Office (DPSSO) for comparable transactions performed in the Mechanization of Contract Administration Services (MOCAS) system. If the MOCAS standards are fair approximations of the times required for DISMS activities, then Table 2 shows that the various DISMS inquiries will require more than 93 manhours per day. If, as indicated by DISMS personnel, an average of 200 users will be making those inquiries, then each user would average approximately one-half hour per day on inquiry tasks alone. Although, on the surface, this number may appear to be somewhat large, the project analysts have concluded that it is within reason.

Similar analyses of the remaining processes were performed. The largest Increment IV process (accounting for 54 percent of the estimated manhours) is Bid Response. If an average of 100 users (buyers and procurement clerks) are involved in this process, approximately 1.7 hours per day would be devoted to Bid Response transactions. Assuming this to be a fair estimate and, given that the transaction volumes were derived largely from historical data, the project analysts have concluded that the Bid Response transaction estimates are reasonable.

The total DISMS workload is estimated to be 320 hours per day or about three hours per day per user (assuming an average of 100 users). Based on discussions with DISMS personnel, this appears to be a realistic estimate of the time that will be required to perform the various Increment IV online transactions.

C. Replacement/Displacement of Transactions. One of the issues examined in this study was the possibility that some Increment IV transactions, especially in the Post Award process, might replace or displace existing Increments I, II or III transactions. This would determine to what extent Increment IV would add to existing demands on the DISMS computer. Discussions with both DPSC personnel and DSAC analysts revealed that such transactions could not be readily identified. However, it was the opinion of those personnel that any replacement or displacement would be insignificant. Therefore, for computer sizing purposes, the Increment IV transactions presented in this report should be considered as totally additive to the existing DISMS workload.

V. CONCLUSIONS

A. The implementation of DISMS Increment IV will result in the addition of more than 196,000 online transactions per month. Those transactions will result in an increase of 4550 enter-key depressions per hour during the peak operating periods of the DISMS computer system.

B. The two largest Increment IV processes are the Bid Response and Inquiry processes. It is estimated that these two processes will account for 90 percent of the Increment IV transactions, 86 percent of the Increment IV computer system throughput (EKDs) and 83 percent of the user manhours required.

C. The transaction data and monthly volume estimates, presented in this report, are believed to be reasonable estimates of the impact of Increment IV on the DISMS computer system. This opinion is based on the following facts: consistent definitions have been used in developing this data, many transaction estimates are based on historical data, and the estimates of manhours required to perform these transactions appear to be reasonable.

VI. RECOMMENDATION.

Due to the time constraints associated with this project, there were a number of issues which could not be addressed in depth. It is recommended, therefore, that a detailed study of key DISMS processes (e.g., Bid Response) be undertaken. Such a study should include the development of a model to simulate these key processes from a user (as opposed to system) perspective. Possible areas for investigation in such a study would include alternatives to the use of the DISMS data base management system (TIS) for selected DISMS processes, the appropriate use of batch versus online modes of operation, the utilization of employees and other resources and the evaluation of computer response time requirements.

TABLE 2

DISMS WORKLOAD ANALYSIS

ESTIMATED MAN-HOURS REQUIRED FOR DISMS INCREMENT IV TRANSACTIONS

		VOLUME PER MONTH	EKDs PER MONTH	SCAN PERCEPTION/ DATA ENTRY TIME PER EKD (SEC)	SCREEN TO SCREEN RESPONSE TIME (SEC)	MAN-MINUTES PER MONTH	MAN-HOURS PER MONTH	MAN-HOURS PER DAY
BASIC AGREEMENTS	BPAs	647	1658	60.0	5.0	1796.2	29.9	1.36
	IDTCs	747	1564	60.0	5.0	1694.3	28.2	1.28
	TOTALS	1394	3222			3490.5	58.2	2.64
PRE-POST PENDING AWARDS	ADMIN DATA	1500	7500	60.0	5.0	8125.0	135.4	6.16
	ACCEPT SABERS	1350	2700	60.0	5.0	2925.0	48.8	2.22
	COMP LINES	1350	20250	60.0	5.0	21937.5	365.6	16.62
	ADD LINES	2250	6750	60.0	5.0	7312.5	121.9	5.54
	COMMIT ADJ	300	600	10.0	5.0	150.0	2.5	0.11
	DRAFT PRNT	1200	2400	10.0	5.0	600.0	10.0	0.45
	RLSE CONTR'T	1500	3000	10.0	5.0	750.0	12.5	0.57
	OTHER	105	315	10.0	5.0	78.8	1.3	0.06
	TOTALS	9555	43515			41878.8	698.0	31.73
POST-POST PENDING AWARDS	DSR-E	25	50	60.0	5.0	54.2	0.9	0.04
	NSC	500	1000	60.0	5.0	1083.3	18.1	0.82
	DSR-PAC	700	1400	60.0	5.0	1516.7	25.3	1.15
	FF & V	1600	3200	60.0	5.0	3466.7	57.8	2.63
	TOTALS	2825	5650			6120.8	102.0	4.64

TABLE 2 (cont)

PROCESS FUNDS	ESTABLISH RESERVES	300	600	10.0	5.0	500.0	8.3	0.38
	TOTALS	300	600			500.0	8.3	0.38
BID RESPONSE	VENDOR RESP	9800	19600	60.0	5.0	21233.3	353.9	16.09
	REPS/CERTS	9800	19600	60.0	5.0	21233.3	353.9	16.09
	UQ-LINE	98000	98000	60.0	5.0	106166.7	1769.4	80.43
	UQ-NSN	1250	3750	60.0	5.0	4062.5	67.7	3.08
	UQ-OTHER	9800	29400	60.0	5.0	31850.0	530.8	24.13
	VQ-ALL/NONE	4900	9800	60.0	5.0	10616.7	176.9	8.04
	VQ-MIN/MAX	4900	9800	60.0	5.0	10616.7	176.9	8.04
	VQ-TIE-INS	1500	4500	60.0	5.0	4875.0	81.3	3.69
	VQ-ESC/DE-ESC	500	1000	60.0	5.0	1083.3	18.1	0.82
	VEND OPTIONS	1250	3750	60.0	5.0	4062.5	67.7	3.08
	OFF ABSTRACT	1100	2200	10.0	5.0	550.0	9.2	0.42
	OFFER EVAL	980	1960	10.0	5.0	490.0	8.2	0.37
	INQUIRIES	980	9800	30.0	5.0	5716.7	95.3	4.33
	TOTALS	144760	213160			222556.7	3709.3	168.60

TABLE 2 (cont)

INQUIRIES	SOLICITATION	3000	45000	30.0	5.0	26250.0	437.5	19.89
	PEND CONTR'T	2000	18000	30.0	5.0	10500.0	175.0	7.95
	CONTRACT	18000	126000	30.0	5.0	73500.0	1225.0	55.68
	PR	1500	10500	30.0	5.0	6125.0	102.1	4.64
	VENDOR	1000	2000	30.0	5.0	1166.7	19.4	0.88
	SPLY BUL	1000	4000	30.0	5.0	2333.3	38.9	1.77
	CGC	50	150	30.0	5.0	87.5	1.5	0.07
	CLAUSE DATA	25	175	30.0	5.0	102.1	1.7	0.08
	STD MOD STMT	50	100	30.0	5.0	58.3	1.0	0.04
	IDTC	10	60	30.0	5.0	35.0	0.6	0.03
	BPA	20	40	30.0	5.0	23.3	0.4	0.02
	VEND PERF	1500	4500	30.0	5.0	2625.0	43.8	1.99
	ITM PROC HIS	50	150	30.0	5.0	87.5	1.5	0.07
	REGS/TABS	143	429	30.0	5.0	250.3	4.2	0.19
	TOTALS	28348	211104			123144.0	2052.4	93.29

TABLE 2 (cont)

MAINTENANCE	REGS/TABS	100	200	60.0	5.0	216.7	3.6	0.16
	VEND FILE	50	250	60.0	5.0	270.8	4.5	0.21
	CGC FILE	10	10	60.0	5.0	10.8	0.2	0.01
	CLAUSE/MS	10	80	60.0	5.0	86.7	1.4	0.07
	CONT PROV PKG	500	4500	60.0	5.0	4875.0	81.3	3.69
	SPLY BUL	30	90	60.0	5.0	97.5	1.6	0.07
	TOTALS	700	5130			5557.5	92.6	4.21
PENDING AMENDMENTS	ADMIN DATA	300	900	60.0	5.0	975.0	16.3	0.74
	OTHER	70	105	60.0	5.0	113.8	1.9	0.09
	TOTALS	370	1005			1088.8	18.1	0.82
PRE-SOLICITATION	SUPPLY CHGS	600	600	60.0	5.0	650.0	10.8	0.49
	BUYER CHGS	600	600	60.0	5.0	650.0	10.8	0.49
	REPORTS	240	480	10.0	5.0	120.0	2.0	0.09
	INQUIRY KEYS	500	500	30.0	5.0	291.7	4.9	0.22
	ALL OTHER	130	130	10.0	5.0	32.5	0.5	0.02
	TOTALS	2070	2310			1744.2	29.1	1.32
PENDING SOLICITATION	ADMIN DATA	250	500	60.0	5.0	541.7	9.0	0.41
	REVIEW/REV	250	3750	60.0	5.0	4062.5	67.7	3.08
	CANCEL	2	2	10.0	5.0	0.5	.0	.00
	TOTALS	502	4252			4604.7	76.7	3.49

TABLE 2 (cont)

RACER	INQUIRIES	70	210	60.0	5.0	227.5	3.8	0.17
	MAINTENANCE	50	150	60.0	5.0	162.5	2.7	0.12
	TOTALS	120	360			390.0	6.5	0.30
REALTIME RECOMMENDED BUYS	ESTABLISH	350	1050	60.0	5.0	1137.5	19.0	0.86
	CHANGE	275	825	60.0	5.0	893.8	14.9	0.68
	DELETE	40	120	60.0	5.0	130.0	2.2	0.10
	RELEASE	350	1050	60.0	5.0	1137.5	19.0	0.86
	INQUIRIES	500	1500	60.0	5.0	1625.0	27.1	1.23
	REQ DEL SCHED	100	300	60.0	5.0	325.0	5.4	0.25
	PRNT DEL SCHED	100	300	60.0	5.0	325.0	5.4	0.25
	TOTALS	1715	5145			5573.8	92.9	4.22
TOTALS FOR ALL TRANSACTIONS		192659	495453			416649.6	6944.2	315.64

APPENDIX A

DSAC Computer Sizing Study, June 1986

DEFENSE LOGISTICS AGENCY
SYSTEMS AUTOMATION CENTER
POST OFFICE BOX 1605
COLUMBUS, OHIO 43216-5002

3 JUN 1986

IN REPLY REFER TO DSAC-T-86-844 (TMM/Mr. Larick/AV 850-9433/js)

SUBJECT: DPSC Capacity Planning Interim Report III

TO: DLA-ZW

1. References:

a. DSAC-TAC letter, 08 Aug 85, subject: DPSC Capacity Planning Interim Report.

b. DSAC-TAC letter, 07 Nov 85, subject: DPSC Capacity Planning Interim Report II.

2. BACKGROUND:

a. DSAC has been engaged in an ongoing capacity planning study for DPSC. As more detailed information has become available, this study has been successively refined. Our last report, 1 b, was based on a baseline model of DISMS Increments 1 and 2 and an estimate of the size of Increments 3 and 4 used for a FEDSIM long-range capacity assessment. That report indicated a potential capacity shortfall. Since that report, we have created a new baseline model, which includes Increment 3, and have integrated a first cut CRYSTAL model of Increment 4 with the baseline. This report summarizes the preliminary results of this latest work.

b. The PSC1 computer system, an AMDAHL 470V8, currently supports the following major workloads: DISMS Increments 1, 2 and 3; APCAPS; TSO; and Batch. DISMS Increment 4 is scheduled to be added to this system.

c. DSAC-T has developed and validated a baseline model using SMF data from January, 1986. The baseline includes DISMS Increments 1, 2, and 3. The total CPU utilization was 69.7 percent busy, with the majority of workload volume originating from the DISMS workload. This model represents the PSC1 system processing at peak volume per hour (enclosure 1).

d. DSAC-V has developed a CRYSTAL model of DISMS Increment 4. The DISMS Increment 4 CRYSTAL model records CPU utilization at 34.1 percent utilization. This model represents Increment 4 at peak processing for an hour (see enclosure 1).

3. PURPOSE:

This study is to determine the size of computer DPSC might require for the proposed DISMS Increment 4 upgrade.

4. ASSUMPTIONS:

The integration of the DISMS Increment 4 CRYSTAL model with the current system baseline model represents the proposed system.

5. METHODOLOGY:

a. The baseline and CRYSTAL models were integrated, using standard modeling techniques.

b. DISMS maximum number of active tasks (MAX-MPL) was increased to measure effect.

c. Only uniprocessors were evaluated, because of the "single TCB" architecture of the current version of TIS. DISMS can use only one processor, regardless of the number of processors available. For this reason, dyadic and quadratic processors were eliminated as candidates for a PSC1 upgrade in this study. For a more detailed discussion of this issue, see DPSC Capacity Planning Interim Report II.

d. CPU upgrades of an AMDAHL 5850, AMDAHL 5860 and IBM 3090-180 were modeled and compared. The AMDAHL 5850 was assumed to be 39% faster, and the AMDAHL 5860 79% faster than the current system, an AMDAHL 470V8. These speed estimates were based on published maximum service unit (MSU) values. The IBM 3090-180 was assumed to be 111% faster than the current system. The speed factor for this upgrade was based on a performance indicator from COMPUTERWORLD Magazine, since the 3090-180 MSU value has not been published.

e. The PSC1 system currently runs APCAPS Increment 1, which has peak processing on payday Fridays. Since our baseline model does not include APCAPS processing at a peak payday interval, we added an APCAPS payday workload to the baseline. APCAPS transaction arrival rates are significantly increased in this scenario, from 43 transaction in the baseline to 3324 transactions per hour in the payday APCAPS scenario. CPU upgrades of the AMDAHL 5850 AMDAHL 5860 and IBM 3090-180 were analyzed.

f. Best/1 was used to predict when the integrated models of CPUs under study would become saturated, if DISMS transaction arrival rates were increased incrementally. Utilization statistics were summarized. The Relative Computer Power (RCP) of an AMDAHL 470V3 is 310, an AMDAHL 5850, 465, an AMDAHL 5860, 620, an IBM 3090-180, 731. When these RCP values are multiplied by their respective utilization projections, all points coverage to the line:

$$Y = .0455402X + 24.64836,$$ given Y = RCP, X = transaction arrival rate.

A chart was developed, plotting RCP values by transaction arrival rate (see figure 1). Another chart was developed, showing the RCP requirements over time

based on a 20% annual growth rate (see figure 2). The starting point of this graph assumes Increment 4 has gone into production. This chart represents an average linear growth, when in actuality the system would experience a rapid increase in utilization with each implementation of an increment. A 20% annual growth rate seems reasonable based on historical data and CRYSTAL projections of Increment 4. Assuming Increment 4 will be implemented July 1987, four and one half years will have passed since Increment 1 went into production. Increments 1, 2, and 3 currently consume 57.5% of an AMDAHL 470V8. Increment 4 is projected to consume 34.1% more of the current system, bringing total utilization to 91.6%. To find the annual growth rate, we divided 91.6% by 4.5, arriving at approximately 20%.

6. RISK IN ANALYSIS:

a. The TIS Modeling Support Library and CRYSTAL model have not been completely validated, therefore, the results presented in this report are rough cut.

b. DISMS Increment 4 is currently in the design stage; consequently, there was limited information available while building the CRYSTAL model.

c. Due to the lack of information regarding DISMS Increment 4 files and a problem with saturated direct access storage devices (DASD), the I/O subsystem of the CRYSTAL model excluded seek and revolution parameters. Analysis was restricted to CPU and memory analysis because of this factor. Also, the model will understate response time because delays due to seek and revolution time were not included.

7. RESULTS:

a. After integration of both models on the AMDAHL 470V8, DISMS experiences a large task queue waiting for an MPL slot. In TIS terms, this means that the number of active tasks is too low. DISMS response time is unrecordable, because of excessive queuing for an active task slot. Throughput for the DISMS workloads is less than arrival rate.

b. Raising DISMS maximum active tasks from 8 to 10 reduces DISMS response time to 12.97 seconds. Increasing the number of active tasks requires more virtual memory and increases the region size requirements for DISMS. We understand that the size of the private area has limited the DISMS region size to about 5.5 megabytes. It may be necessary to take steps to increase the size of the private area before the number of active tasks can be raised. This would mean reducing the size of the system areas (e.g. PLPA, CSA, MLPA). CPU utilization is recorded at 100 percent, suggesting that DISMS Increment 4 will not fit on the current hardware (See enclosure 1).

c. When an upgrade to an AMDAHL 5860 and integration of both models was evaluated, total CPU utilization was estimated to be 78.1%. If a payday APPAPS

workload is interchanged with the non-peak APCAPS workload, total utilization jumps to 90.4%. A 16% increase in DISMS transation volume would completely saturate the CPU (see enclosure 2).

d. When an upgrade to an AMDAHL 5860 and integration of both models was evaluated, total CPU utilization was estimated to be 60.7%. If a payday APCAPS workload was added, total CPU utilization was calculated to be 70.3%. A 58% increase in DISMS transaction volume was attained before the CPU was saturated (see enclosure 2).

e. When an upgrade to an IBM 3090-180 and integration of both models was evaluated, total CPU utilization was estimated to be 51.5%. If a payday APCAPS workload was added, total CPU utilization was estimated to be 59.6%. An 84% increase in DISMS transaction volume was attained before response time became unrecordable (see enclosure 2).

f. Response time results were estimated to be acceptable (under five seconds) for all upgrade scenarios evaluated. However, response times are suspected to be optimistic or low, since the CRYSTAL model excluded seek and revolution parameters from the model's I/O subsystem. The CPUs under consideration have up to twice as many channels as currently available on the AMDAHL 470V8. This increased configuration flexibility will improve tuning opportunities and I/O bottleneck resolution.

9. CONCLUSIONS:

a. DISMS Increment 4 processing at peak volume will not fit on the current hardware, an AMDAHL 470V8.

b. An AMDAHL 5850 would be able to handle an application upgrade to DISMS Increment 4. However, at peak processing volume the potential for future DISMS increment growth would be limited.

c. An AMDAHL 5860 would be able to handle an application upgrade to DISMS Increment 4, with sufficient room for workload growth.

d. An IBM 3090-180 would easily absorb DISMS Increment 4. Based on utilization estimates, this CPU has a substantial amount of capacity available for future DISMS growth.

e. Our study indicates that it may be necessary to increase the number of active tasks for DISMS when Increment 4 is added. Our understanding, from discussions with DPSC and DSAC-V personnel, is that there is a limit on the private area of about 5.5 megabytes. This situation should be reviewed, with the goal of identifying ways to increase the size of the private area.

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[illegible] duction

f. As more detailed information becomes available, the CRY$TAL model of Increment 4 will be refined.

FOR THE COMMANDER:

John B. Froehle, Jr.

2 Encl

JOHN B. FROEHLE, JR.
Director, Office of
Computer Systems Support

cc:
DSAC-D
DSAC-DD
DSAC-S
DPSC-Z (D. Killian)
DSAC-V

Baseline model of PSC1 computer system

Workload	Response Time	Throughput	Utilization
DISMS	4.06	3703	57.5
TSO	0.56	1755	2.4
BATCH	382.33	10	2.9
APCAPS	2.21	43	0.2
SHARED	3.18	3600	0.0
OTHER	0.98	3600	6.7
TOTAL			69.7

Crystal model of DISMS Increment 4

Workload	Response Time	Throughput	Utilization
DISMS INCR 4	1.39	3375	34.1

Integration of baseline and Increment 4 models

Workload	Response Time	Throughput	Utilization
DISMS	********	3108	51.7
DISMS INCR 4	********	3252	28.6
TSO	0.75	1755	2.4
BATCH	3439.69	10	2.9
APCAPS	2.48	43	0.2
OTHER	********	3600	9.7
TOTAL			94.5

- Disms workload throughput less than arrival rate of 3703
- Disms Incr 4 workload throughput is less than arrival rate of 3975

Increase DISMS Max-MPL to 10

Workload	Response Time	Throughput	Utilization
DISMS	14.99	3703	59.4
DISMS INCR IV	11.91	3375	34.1
TSO	338.25	1222	1.7
BATCH	********	0	0
APCAPS	2.47	43	0.2
OTHER	********	2597	4.7
TOTAL			100.1

Upgrade CPU to AMDAHL 5850

Workload	Response Time	Throughput	Utilization
DISMS	3.20	3703	44.8
DISMS INCR 4	1.89	3875	24.5
TSO	0.55	1755	1.7
BATCH	422.03	10	2.1
APCAPS	2.15	43	0.2
OTHER	0.97	3600	4.8
TOTAL			78.1

Upgrade CPU to AMDAHL 5860

Workload	Response Time	Throughput	Utilization
DISMS	2.45	3703	34.9
DISMS INCR 4	1.39	3875	19.1
TSO	0.53	1755	1.3
BATCH	317.90	10	1.6
APCAPS	2.02	43	0.1
OTHER	0.81	3600	3.7
TOTAL			60.7

Upgrade CPU to IBM 3090-180

Workload	Response Time	Throughput	Utilization
DISMS	2.23	3703	29.6
DISMS INCR 4	1.26	3875	16.2
TSO	0.52	1755	1.1
BATCH	303.04	10	1.4
APCAPS	1.97	43	0.1
OTHER	0.78	3600	3.2
TOTAL			51.5

When a payday APCAPS workload is added to the AMDAHL 470V8 the CPU is so saturated results cannot be calculated by BEST/1

AMDAHL 5850 with payday APCAPS workload added

Workload	Response Time	Throughput	Utilization
DISMS	4.77	3703	44.8
DISMS INCR 4	2.89	3875	24.5
TSO	0.73	1755	1.7
BATCH	1154.03	10	2.1
APCAPS	9.04	3324	12.5
OTHER	1.91	3600	4.8
TOTAL			90.4

AMDAHL 5860 with payday APCAPS workload added

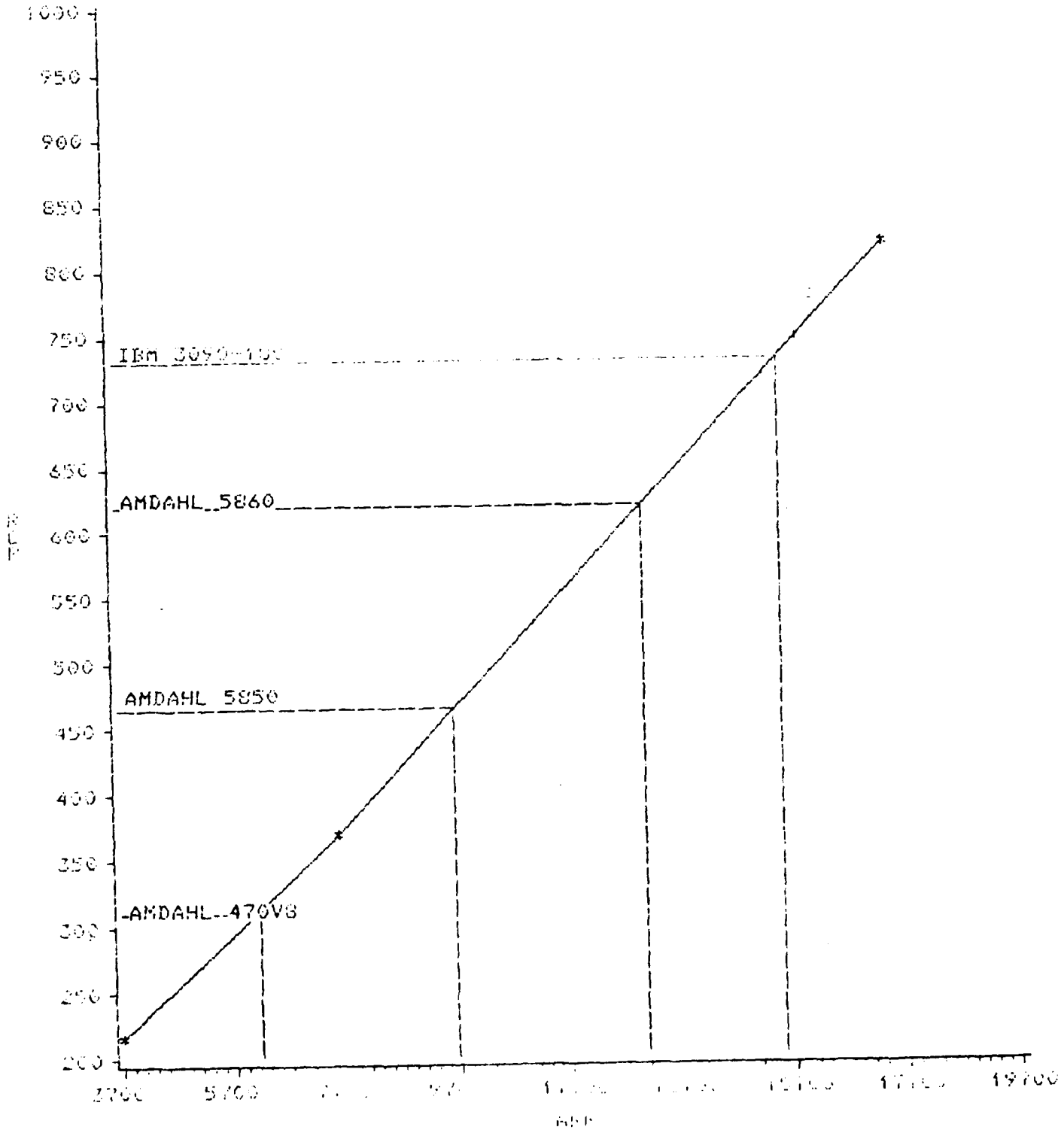
Workload	Response Time	Throughput	Utilization
DISMS	2.75	3703	34.9
DISMS INCR 4	1.55	3875	19.1
TSO	0.65	1755	1.3
BATCH	408.28	10	1.6
APCAPS	8.75	3324	9.7
OTHER	1.15	3600	3.7
TOTAL			70.3

IBM 3090-180 with payday APCAPS workload added

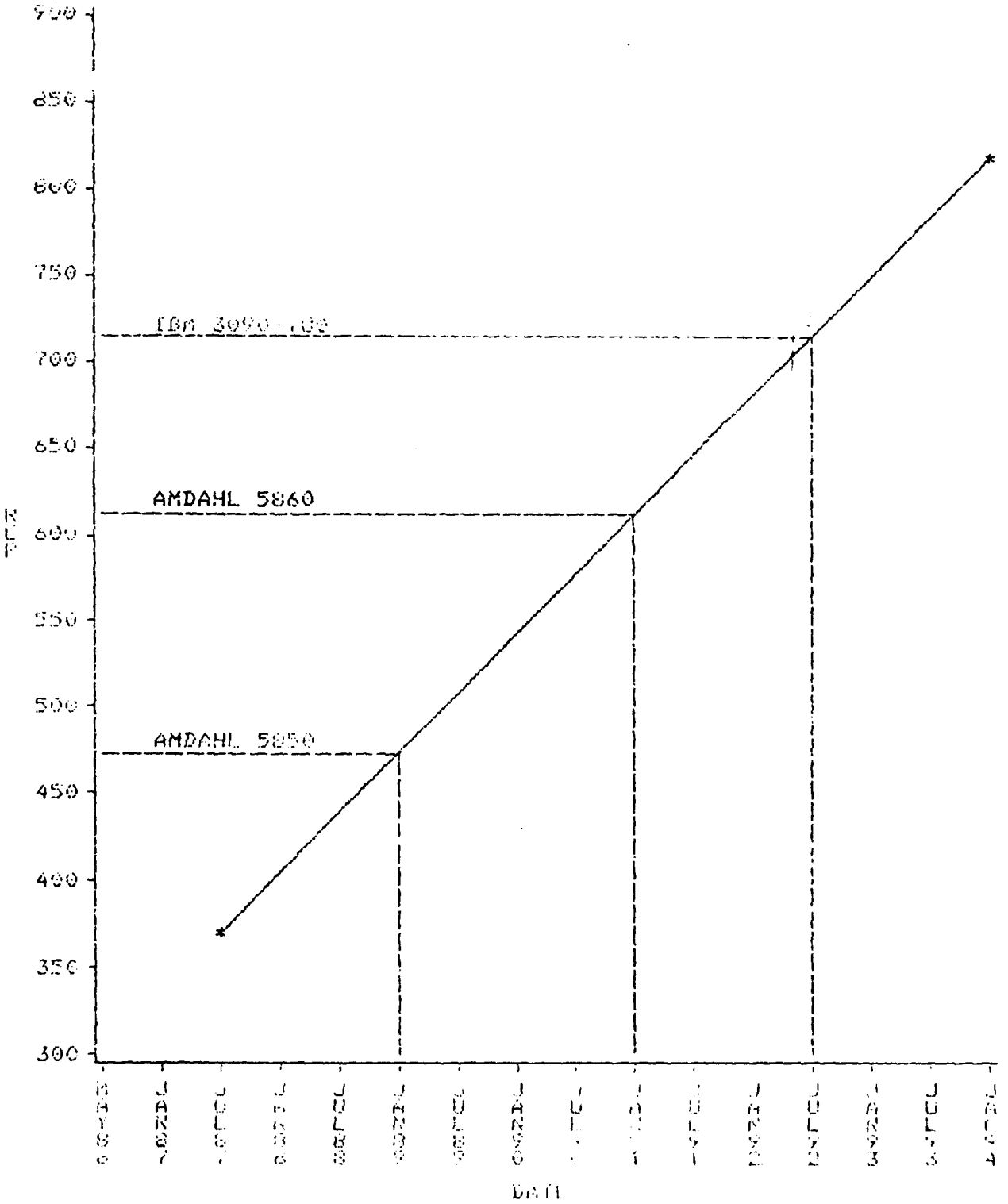
Workload	Response Time	Throughput	Utilization
DISMS	2.41	3703	29.6
DISMS INCR 4	1.34	3875	16.2
TSO	0.64	1755	1.1
BATCH	374.33	10	1.4
APCAPS	8.69	3324	8.2
OTHER	1.34	3600	3.2
TOTAL			59.6

The maximum transaction arrival rates of various CPU RCP values are depicted on chart 1. From this a projection is made to predict the estimated life of the CPU at a 20% annual growth (see chart 2). Increment 4 is projected to use 7,500 transactions per hour. From chart 1, we see that the AMDAHL 470V8 will have a capacity shortfall. The AMDAHL 5850 can support approximately 9,600 transactions per hour, and has a life expectancy of January, 1989. The AMDAHL 5860 can support approximately 13,100 transactions per hour and has a life expectancy of January 1991. The IBM 3090-180 can support approximately 15,500 transactions per hour and has a life expectancy of July 1992.

RCP REQUIREMENTS
by TRANSACTION ARRIVAL RATE



RCP REQUIREMENTS
20% ANNUAL GROWTH RATE



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MARCH, 1988

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